

DEVELOPMENT AND VALIDATION OF A NEW PROGNOSTIC INDEX FOR MORTALITY RISK IN MULTIMORBID ADULTS

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Background: why another prognostic index?

Healthcare needs

- Very high mortality among patients with multimorbidity
- Treatment and preventive strategy should be adapted to the mortality risk

Research gap

- No tool to estimate mortality among multimorbid patients in clinical practice
- Not accounted for clinical features of multimorbidity, e.g. severity of comorbidities and functional impairment

Objective

To develop and internally validate a 1-year mortality prognostic index for older multimorbid adults.

Protocol published ✓
Oral presentation at SPHC ✓
Manuscript submission ✓



see operam-cohort.biham.ch

Methods: how to develop and validate

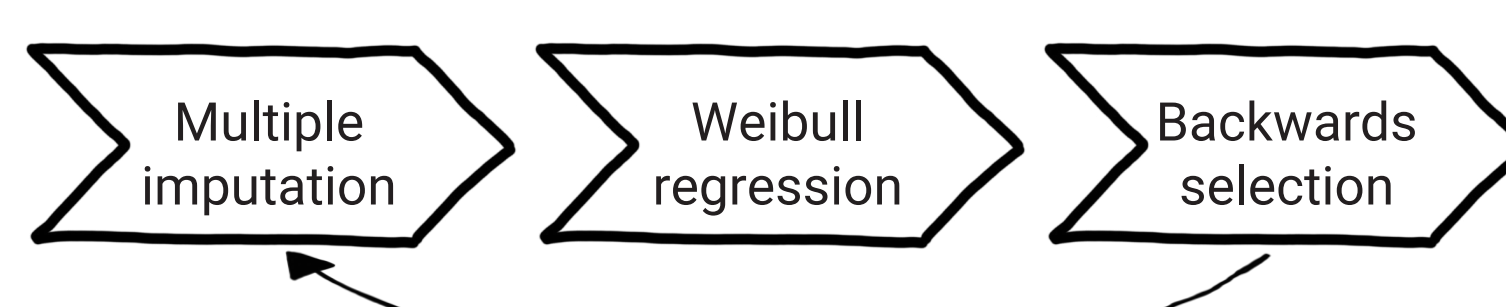
Data source

- OPERAM cohort in Bern, Switzerland
- 822 older, polymedicated, multimorbid adults



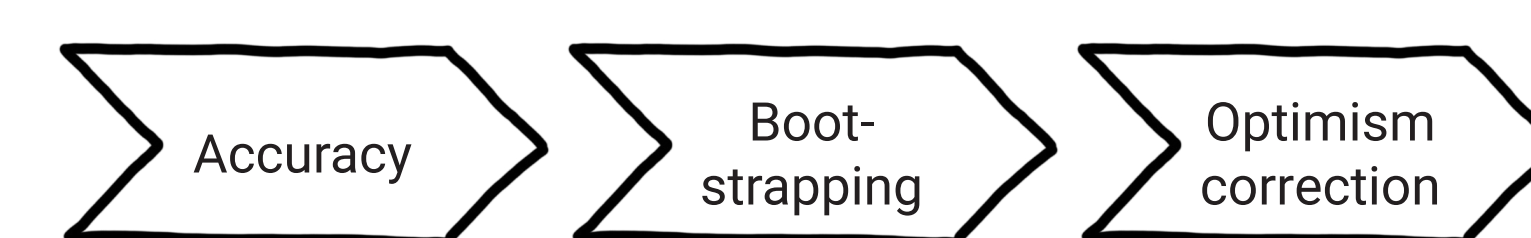
Development

- Primary outcome: time to all-cause mortality over 1-year of follow-up
- Model: parametric Weibull regression



Internal validation

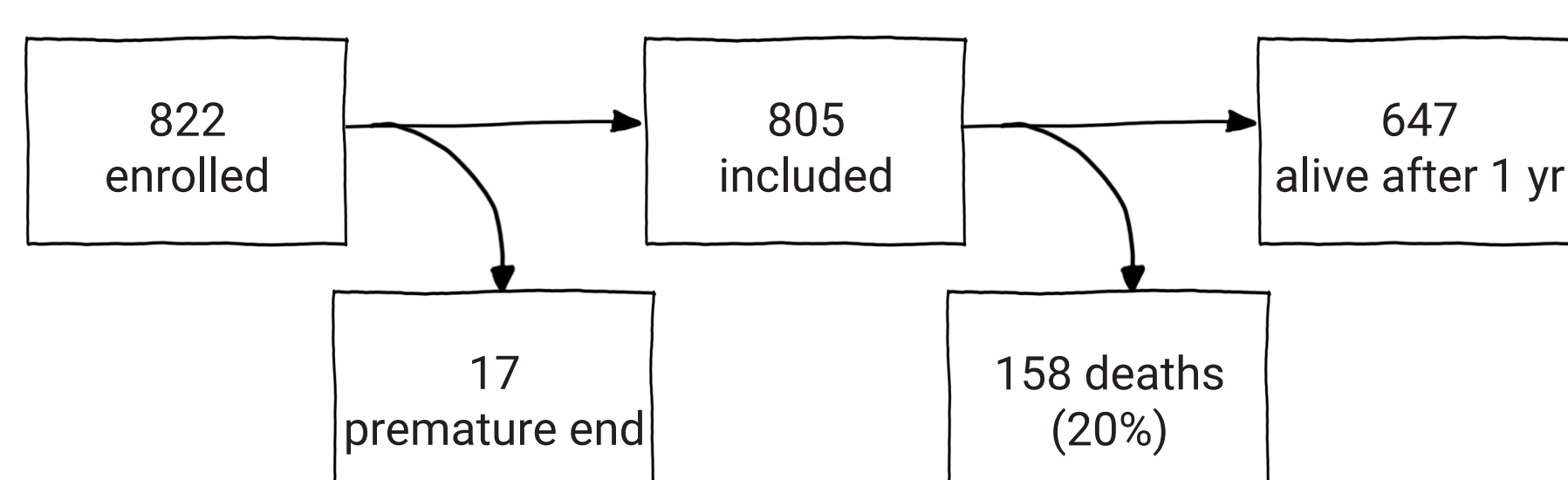
- Accuracy by discrimination and calibration
- Optimism = bootstrap performance - test performance



Results: risk score with useful discrimination

Baseline characteristics

Female, n (%)	347 (42.2)
Age, median [IQR]	79 [74.0; 84.0]
Education, n (%)	
University	151 (18.4)
High school	491 (59.7)
Less than high school	170 (20.7)
Dementia, n (%)	82 (10.0)
History of Cancer, n (%)	324 (39.4)
History of CVD, n (%)	528 (64.2)
Chronic medication intake, median [IQR]	10 [6.5; 13.5]



Predictors of 1-year mortality

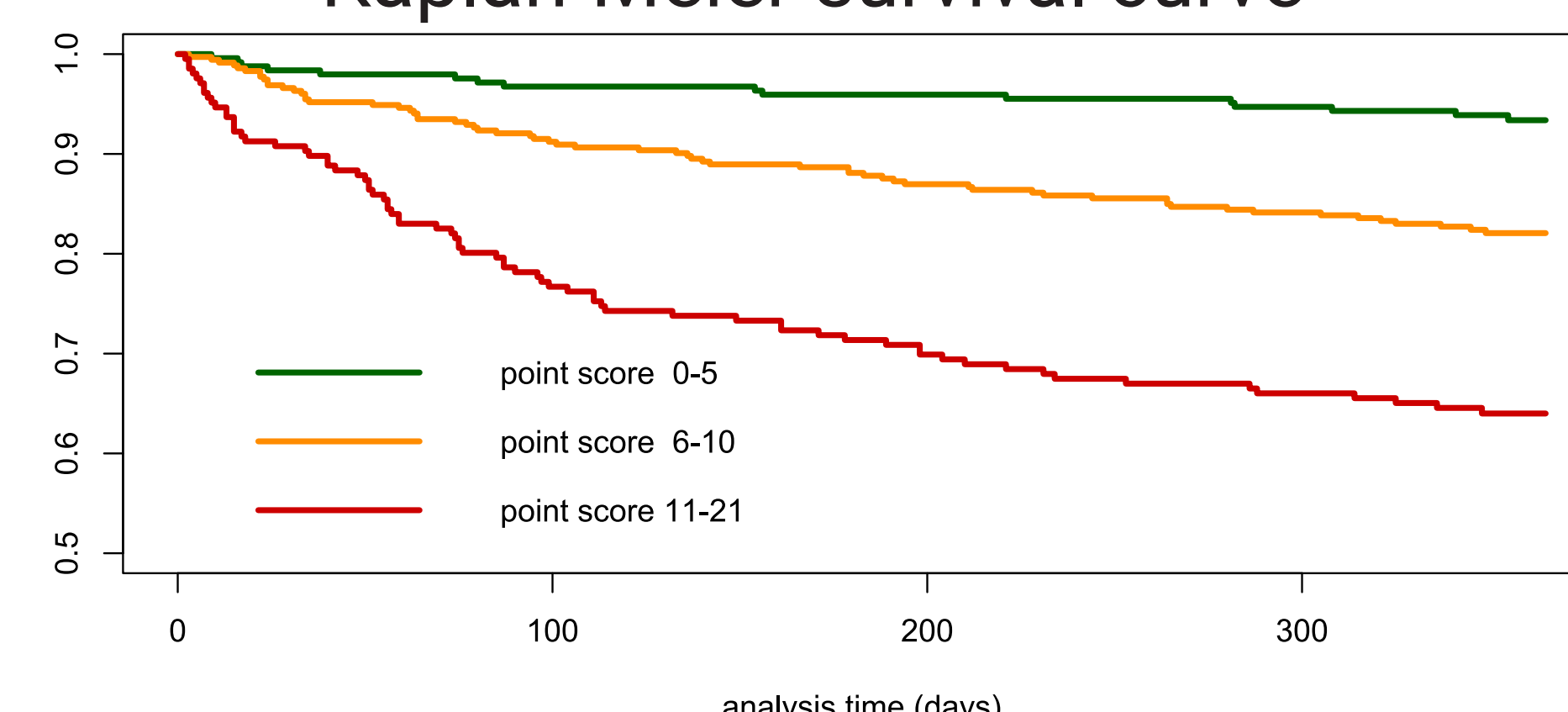
Predictor	Categories	HR (95% CI)	β	p	Risk points
Age	70-79 80-99	ref 1.32 (0.95-1.81)	ref 0.27	<.01	1
Charlson comorbidity index	0-2 ≥ 3	ref 2.12 (1.54-2.93)	ref 0.75	<.001	4
Drugs	<10 ≥ 10	ref 1.23 (0.87-1.73)	ref 0.21	0.25	1
Body mass index	≥ 30 <30	ref 1.65 (1.07-2.57)	ref 0.52	0.03	2
Hospitalisations during last year	0 ≥ 1	ref 1.32 (0.95-1.84)	ref 0.27	0.09	1
Barthel index	>90 61-90 21-60 ≤ 20	ref 1.95 (1.30-2.94) 3.03 (1.97-4.68) 7.49 (4.28-13.10)	ref 0.68 1.11 1.99	ref <.01 <.001 <.001	3 5 9
Nursing home residence	no yes	ref 1.99 (1.14-3.46)	ref 0.69	0.02	3

Performance

- Optimism adjusted
- discrimination: c-statistic 0.70
- calibration: c-slope 0.93

Risk score	Category	No. who died / No. at risk (%)
0-5	Low	16 / 246 (7)
6-10	Middle	66 / 353 (19)
11-21	High	76 / 206 (37)

Kaplan-Meier survival curve



Discussion: next steps to life expectancy estimation

Strengths

- Use of rare high-quality data
- Specific to multimorbid older adults
- Useful discrimination into risk groups

Limitations

- External validation still required!
- Limited generalizability
- Indices (Charlson, Barthel) as predictors reduce the ease of use at the point of care

Next steps

- Development of 3-year mortality index
- Derivation of life expectancy estimator
- Comparison to recalibrated indices
- Interactive web application
- Assessment of clinical usability



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References

Gastens, Viktoria, et al. "Development and validation of a life expectancy estimator for multimorbid older adults: a cohort study protocol." *BMJ open* 11.8 (2021): e048168.